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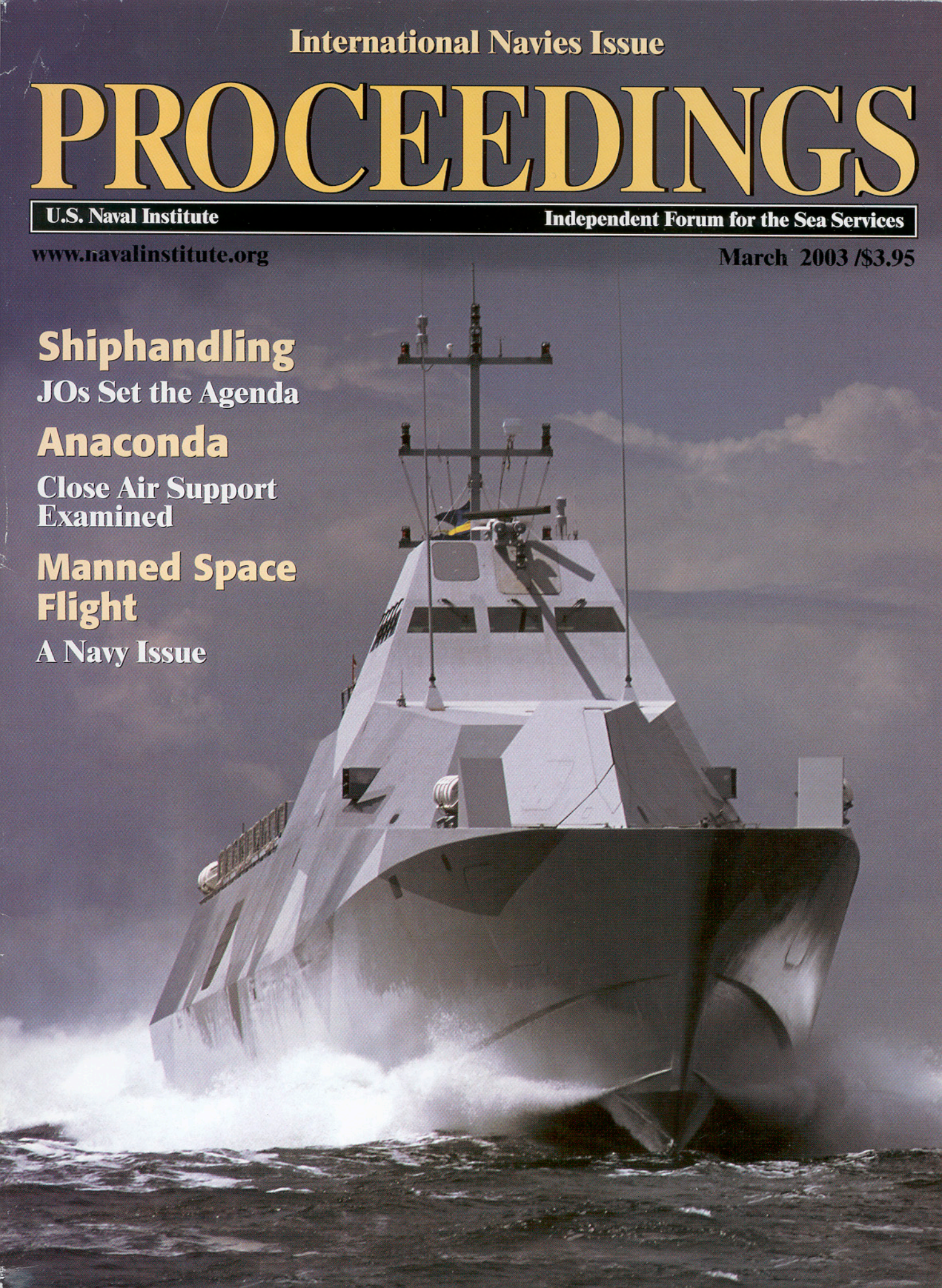

China's Subs Lead the Way

By Dr. Lyle Goldstein and Lieutenant Commander Bill Murray, U.S. Navy

While the U.S. military remains focused on the Middle East and Central Asia, China continues its rapid military modernization. Perhaps the most significant development for the U.S. Navy is China's extensive efforts to upgrade its submarine force. In addition to signing a contract with Russia for eight new Kilo-class diesel submarines last May, China continues to field its new indigenous Song class. The appearance of its new nuclear attack submarine (SSN) is imminent. Finally, Beijing is upgrading the submarine force's weaponry, recruitment, training, and doctrine—all of which suggest that submarines will form the backbone of China's gradual strategic reorientation toward maritime priorities. As one Chinese strategist recently wrote: "Submarines are the maritime weapons posing the greatest threat to an aircraft carrier formation. Submarines are also our Navy's core force."[1] Retired Navy Rear Admiral Michael McDevitt, a close observer of the Chinese Navy, similarly contends that submarines "are an essential ingredient in the . . . maritime strategy of China," and calls for focused research on China's submarine force.[2]

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China's maritime strategy relies heavily on submarines to patrol the littorals, blockade the Taiwan Strait, and stalk aircraft carriers. The U.S. Navy should not underestimate China's ability to build a capable submarine force to challenge a superior maritime foe. Here, from back to front, a Xia-class submarine patrols with a Kilo and two Mings.

Diesels for the Littoral

The scale of China's $1.6-billion Kilo purchase suggests that People's Liberation Army-Navy (PLAN) strategists view diesel submarines as a vital asset. The eight new Project 636 Kilos, which are Russia's "best," will augment two older 636s and two somewhat more limited Project 877s that China already owns. Combined, these 12 imported submarines will help make China's 30 aging Romeos and its 20-odd Mings (an indigenously modified Romeo) and newer Song-class submarines a formidable prospective undersea opponent in the East Asian littoral.

Even today, the Kilo probably is the most potent of China's submarines. Quiet and well armed, they deserve a measure of respect. The new set of Kilos, which China expects to receive within three to five years, will incorporate a number of significant upgrades, including superior batteries, an enhanced digital sonar system, slower turning screws, and quieter main engines.[3] The weaponry of these new ships also will be more sophisticated. In addition to the heavyweight wire-guided Test-71ME and the 53-65KE wake-homing torpedoes of their predecessors, they will carry the versatile and potent Klub weapon system, giving them the capability to fire land-attack cruise missiles, antiship cruise missiles with supersonic terminal homing, and rocket thrown antisurface and antisubmarine torpedoes. The new Kilos also likely will deploy Russia's supercavitating Skval torpedo, which, according to a Chinese report, travels in excess of 200 knots. Disturbingly, this article hints that the Skval system may already be operational within the PLAN submarine force.[4]

Air independent propulsion (AIP) might enhance the PLAN's next generation of diesel submarines. Although AIP-equipped diesel submarines cannot match the endurance or speed of nuclear submarines, AIP does permit diesel submarines to remain submerged for weeks at a time without snorkeling. European submarine manufacturers offer it as an option on their newest export classes. Pakistan, China's longtime ally, is getting AIP, and there is little reason to believe Beijing will settle for less. In addition, Chinese naval periodicals indicate a significant interest in AIP.[5] The Russian submarine builder Rubin offers a liquid oxygen and hydrogen fuel cell AIP system as an option on the latest Kilo models. Even Chinese-built diesel submarines may soon have AIP. Analysts noted last year that China's 20th Ming-class submarine was two meters longer than its predecessor, fueling speculation that it might be a test bed for an AIP system.[6]

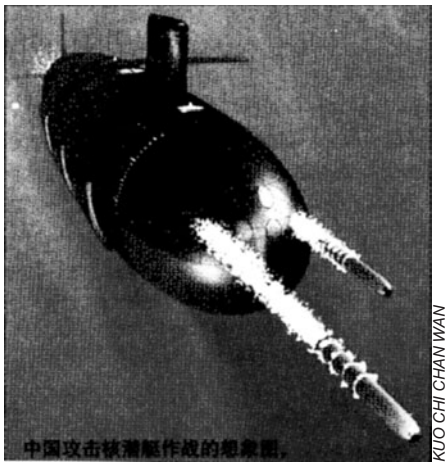
A recent Pentagon report to Congress on Chinese military modernization concludes, "A new advanced version of the Song-class conventional submarine is expected to incorporate advanced AIP." This report details other Song innovations: a skewed seven-blade propeller, submerged antiship cruise missile launch capability, flank array sonars of French design, and German diesel

engines.[7] The PLAN intends the Song to be a modern, capable peer to its imported Kilos. Alternatively, some have interpreted the May 2002 Kilo sale as the death knell of the Song program. Indeed, the half-decade between launches of the first two Songs and the dramatic changes in the second Song's sail suggest possible performance and design troubles. Close analysis, however, of the sail's restructuring suggests that these design flaws were related to acoustic signature rather than underwater stability, as had been speculated in the open press. The recent completion of a third Song, and the apparent continued work on hulls four and five, suggest that the program is going forward.[8] If China does continue to build Songs, the PLAN submarine force is undeniably in the midst of a major near-term buildup.

Blue-Water Ambitions

The PLAN will soon deploy the first successor to its noisy and unreliable first-generation nuclear submarines. The new Type 93 SSN will augment the obsolete Han class, the last of which was commissioned in 1990. Though Chinese nuclear submarines are widely dismissed as obsolete, the Chinese press continues to extol sorties by these SSNs, even claiming that they played a role in the 1996 Taiwan Strait crisis.[9] Open sources state that the Type 93 will have an indigenously manufactured nuclear reactor and be technologically similar to the Russian Victor III, possessing enhanced sonar capabilities and advanced quieting.[10] The first prototype is nearly finished and a bow-on photograph of the vessel in drydock suggests that the ship has both upper and lower bow sonar assemblies, as well as flank arrays. A recent Chinese source, however, claims that the Type 93 will have 65-cm tubes, which suggests it will be able to carry Russia's largest wake-homing torpedo designed specifically to destroy aircraft carriers.[11]

China's second-generation ballistic-missile nuclear submarine (SSBN) lags behind the SSN program. Known as the Type 94, it eventually will replace the 20-year-old, problem-plagued prototype of the Xia class, which itself recently emerged from a major overhaul. Chinese sources assess that the Type 94 aims to have a quieter acoustic signature than the Russian Typhoon, and will deploy with 16 8,000-km-range submarine-launched ballistic missiles, each equipped with three to six warheads.[12] It is likely that the first of the Type 94 SSBNs will not be launched for at least five years, perhaps longer. Despite this delay, the amount of space dedicated to SSBNs in China's journal of naval warfare, *Jianchuan Zhishi*, implies that the PLAN's determination to develop a functional SSBN force remains strong. Taken as a whole, Chinese efforts in nuclear submarines suggest a measured commitment to the development of a blue-water capability over the longer term.



The Type 93 nuclear attack submarine soon will make the leap from concept to reality as a key part of China's blue-water ambitions. Quieter and more reliable than the obsolete Han, the Type 93 also will be able to carry Russian wake-homing torpedoes for attacking aircraft carriers.

Personnel, Training, and R&D

Despite an overall reduction in personnel, the PLAN is building communities of intellectual excellence, including the submarine force. China recognizes that pay incentives help attract qualified specialists in a competitive labor market, and in recent years have initiated generous pay increases. Some ranks saw a salary increase of 100% in 1999-2000. Like their U.S. counterparts, the PLAN reportedly gives priority to "outstanding student cadres whom are willing to volunteer for submarine service."[13] Chinese military leaders have identified a severe deficiency in developing competent noncommissioned officers. Apparently, a policy to redress this problem is producing a new cadre of specialists for undersea warfare.[14] Capping this off, the PLA is putting the finishing touches on a rigorous system of professional military education, including an initiative that replicates the U.S. Reserve Officer Training Corps program. The new system is so similar to the United States that a recent profile of one Chinese submarine force admiral's resume reads similarly to a U.S. counterpart's: Admiral Zhang Xizhao completed two tours at the Qingdao Submarine Academy, and one each at the Nanjing Naval Command and Staff College and at the PLA's National Defense University in Beijing.[15]

Even more significant, the PLAN appears to be implementing a training revolution. As good students of U.S. military operations, Chinese commanders have become increasingly conscious of the imperative for joint planning and operations.[16] For example, the PLAN recently implemented an innovative program of

"cross training" surface and submarine commanders.[17] Another striking facet of their effort to upgrade training is a shift from rote, repetitive drills to "confrontational" training, which allows for greater exercise free play. As with joint operations, this notion appears to be an effort to imitate successful U.S. practices. Competitive, realistic war games also are becoming standard in the fleet and within the submarine force.[18]

Analysts generally agree that after the Taiwan Strait crisis the PLA focused on the United States as its most likely future adversary. Training with U.S. capabilities in mind has enabled its submarine force to incorporate substantial innovations into its exercises. Working under the assumption that its bases would be damaged early in a conflict, for example, the PLAN recently conducted a drill in which torpedoes were loaded onto a submarine at a small civilian port employing mobile cranes and other special equipment.[19] Another drill focused on clearing disabled ships from a vital navigation channel,[20] and a logistics exercise featured practice in disguising important targets and conducting rush repairs.[19] In addition, "seaborne supply" operations have been conducted with the newest submarines.[22]

Beijing's commitment to undersea warfare over the long term depends on developing an outstanding science and technology research system that will sustain the fleet's development. The outlines of such a system are beginning to appear. The PLAN leadership has selected Wuhan and Harbin Universities as sites of maritime engineering excellence. The former, which opened officially in 1999, combines the Navy Engineering and Navy Electronics Academies. The curriculum is focused on "tackling the key problem of fusing and joining electronic information to weapons systems."[23] The latter has colleges of nuclear propulsion and underwater engineering. Recent research achievements of Harbin University for the PLAN include technology for ocean bottom topographic mapping and a dual-use submersible for mine detection and deep-ocean salvage.[24] Chinese researchers also are working on lasers for submarine detection, and remote seabed hydrophone systems. These efforts are complemented by espionage. The director of the acoustic noise laboratory at Russia's Pacific Oceanography Institute is now on trial in Vladivostok for allegedly trying to smuggle secrets to the Chinese.

Nevertheless, it would be a mistake to assume that China's future undersea warfare technology prospects are dependent on Russian expertise. Many U.S. analysts fall into the trap of extrapolating from the PLAN's historical evolution, underestimating the impact of "systemic shocks" such as the Korean War or the Cultural Revolution to that development. It is a serious error, therefore, to predict future developments within the Chinese submarine force based on historical development examples such as that of the Han SSN, which underwent sea trials 16 years after its approval by Chinese leadership.[25]

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In addition to equipment upgrades, the PLAN is revolutionizing training and recruitment of personnel in the submarine community, such as these Kilo crewmembers. Submarine officers now go through a rigorous system of professional military education, and train with an increased focus on the United States as the most likely adversary.

Taiwan and the Blockade Scenario

Analysts generally agree that an invasion of Taiwan will remain beyond the reach of the PLA for at least the next decade. Notwithstanding the steady upgrading of the PLA Air Force, the revamping of Chinese special forces, and the fielding of a vast array of short-range missiles, a critical shortage of modern amphibious landing craft makes a full-scale invasion unlikely. The PLAN's near-term focus on diesel submarines, however, is one of several indicators suggesting that Beijing's preferred coercive tool against Taiwan would be a naval blockade.

As an island with few resources, Taiwan may be vulnerable to this form of coercion. The volatility of Taipei's stock market during previous cross-strait crises suggests that Taiwan's economy could face a meltdown if confronted with determined efforts to subvert it. Compounding this problem, it is likely that the mainland could exploit Taiwan's internal political fissures during a crisis. In other words, speedy capitulation is conceivable if Beijing confronts Taipei with a sophisticated strategy of sticks and carrots.

Chinese diesel submarines would be the decisive force in this troubling scenario. With its older submarines employed as minelayers and decoys, the more

modern submarines could patrol north, south, and east of the island. Even a very few ship sinkings would prompt insurance brokers to revoke their coverage of merchant shipping, and commerce at Taiwan's two biggest ports, Taipei and Kaoshiung, would grind to a halt. Taiwan might try to break the blockade on its own, but its chance of success would be low. Its otherwise formidable air force might fall victim to missile strikes, but even without such strikes, Taiwan's aircraft are not well suited for antisubmarine warfare (ASW) operations. Reportedly, only 6 of their 26 S-2T Tracker ASW aircraft, which have been flying since the late 1950s, are operational.[26] Taiwan's current budget crunch casts doubt on the hoped-for purchase of 12 P-3C Orions from the United States, potentially forcing continued dependence on the unreliable S-2Ts through 2008. The imminent delivery of four *Kidd* (DD-661)-class destroyers will not help either, because the root of Taiwan's ASW woes is an inadequate number of overall platforms for the mission.

There has been much talk of expanding Taiwan's fleet of four diesel submarines, two of which date from World War II. But Taiwan's prospective purchase of eight diesel submarines from the United States is plagued by obstacles. First, it is far from clear that diesel submarines are optimal for the ASW mission. Second, the United States no longer builds diesel submarines, and those U.S. allies that do, such as Germany, are hesitant to jeopardize their relations with Beijing. Third, the PLAN expects to take delivery of eight more Kilos between 2005 and 2007 and might have a system for accelerated crew training given its large force of submarines. By contrast, the earliest Taiwan could receive eight new submarines would be 2010. Moreover, crew training is expected to be a major bottleneck, suggesting some additional years before the vessels are truly operational. This time lag, even under assumptions that favor Taiwan, will bring an even more substantial capability gap later in this decade. Finally, with the Taiwan defense budget at an eight-year low, the possibility of Taiwan making a $4-5 billion commitment for submarines seems remote.[27] Thus, it is unlikely that Taiwan will be able to cope with a blockade imposed by the PLAN in the foreseeable future.

The United States could break the blockade, but the growing capability of the PLAN submarine force will increase the risk to U.S. maritime forces, especially as U.S. antisubmarine warfare capabilities have withered since the end of the Cold War. Alternatively, U.S. SSNs could conduct a campaign against Chinese submarines, especially in the deep waters to the east of the island where the bigger, more sophisticated U.S. submarines could make full use of their superior technology. Even the U.S. submarine force must expect losses, however, given improvements in Chinese submarine platforms, training, weaponry, and the sheer weight of numbers.

Evolving Submarine Doctrine

Previously, PLAN doctrine did not task China's submarines with an ASW role. This is changing, and the development of submarine ASW tactics appears to be a priority.[26] PLAN submarine captains recognize that active pinging is tantamount to suicide and are shifting their focus to improving the performance of passive sonars, including towed arrays.[29] Chinese submarines increasingly are equipped with digital sonar systems that make extensive use of commercial off-the-shelf computer processing technology.[30] Multiple references in Chinese technical journals demonstrate a keen interest in sound surveillance system technology,[31] and China's military analysts also are studying sonar countermeasures.[32] In addition, Chinese sources openly describe using certain submarines as "bait."[33] Relying on this tactic, it is conceivable that U.S. submarines could reveal their presence to lurking Kilos by executing attacks against nuisance Ming-class vessels.

Despite increasing attention to antisubmarine warfare, PLAN writings leave little doubt that destruction of U.S. aircraft carrier battle groups remains the focal point of doctrinal development, and Chinese submarines might be the greatest threat. Chinese planners estimate, "[T]here is no way [for U.S. carriers] to evade . . . reconnaissance and tracking,"[34] and in the Russian tradition believe that a carrier battle group can be destroyed with multiwave and multivector saturation attacks with up to "100 antiship cruise missiles from all launch platforms in a single attack.[35]

The same analysis describes Russia's Cold War-era anticarrier forces in great detail and concludes: "This is Russia's asymmetrical and economical answer to the threat of U.S. aircraft carriers. In the Russian armed forces, no other force could surely fight this threat except submarines."[36] Chinese planners also have duly noted that during World War II, 17 aircraft carriers were sunk by submarines.[37]

Conclusion

China is not the first land power to challenge a maritime nation's sea supremacy by investing disproportionately in submarines. Whether China will succeed where Germany and the Soviet Union failed is one of the greatest questions of maritime strategy for the 21st century.

Consequently, while the U.S. Navy must necessarily focus on projecting power into the Persian Gulf and Central Asia, it should guard its core competence of sea control. Conflict with China is not inevitable. Economic

interdependence mitigates trends toward geopolitical competition. Moreover, close examination of the Taiwan issue discloses significant room for compromise. But if war with China does occur, the U.S. sea service will do the heavy lifting. This means that, for the foreseeable future, the Navy must retain an ability to locate and destroy Chinese submarines.

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